USAF Lost Workday Injury Prevention Initiatives

Descriptive Epidemiology of Lost Workday Injuries, FY93-FY02 (Parts I & II)

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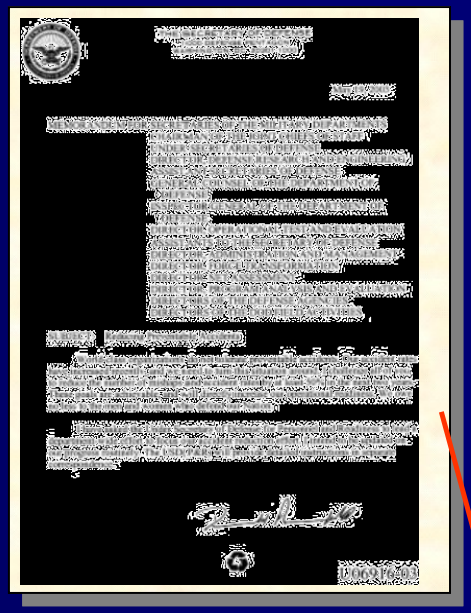
Our mandate



SECDEF Memo Dated 19 May 03

- **Cut number of mishaps & accident rates 5**
- **Accomplish 50% goal in next two years**
- **DoD wide effort managed by USD (P&R)**

World-class organizations do not tolerate preventable accidents. Our accident rates have increased recently, and we need to turn this situation around. I challenge all of you to reduce the number of mishaps and accident rates by at least 50% in the next two years. These goals are achievable, and will directly increase our operational readiness. We owe no less to the men and women who defend our Nation.

I have asked the Under Secretary of Defense for Personnel and Readiness to lead a department-wide effort to focus our accident reduction effort. I intend to be updated on our progress routinely. The USD(P&R) will provide detailed instructions in separate correspondence.

Execution

- Where are the problems—what is their scope? (Step 1 in PH Model)
- How to prevent? (Steps 2/3 in PH Model: determine risk factors; develop prevention strategies)

Needed: Descriptive epidemiology of lost workday injuries

Safety data -- mishaps

Reporting: DoDI 6055.7

- **Scope**: Accidental death, injury, occupational illness, and property damage
- **Injury defined**: Traumatic wound or other condition caused by external force or deprivation (drowning, suffocation, exposure, cold injury, dehydration)
- **Exclusions**: Suicide, homicide, workplace violence, legal intervention
  - Also, combat-related injuries and deaths not included . . . Casualty Reporting System accounts for these
  - Non-AF units (e.g., joint commands)

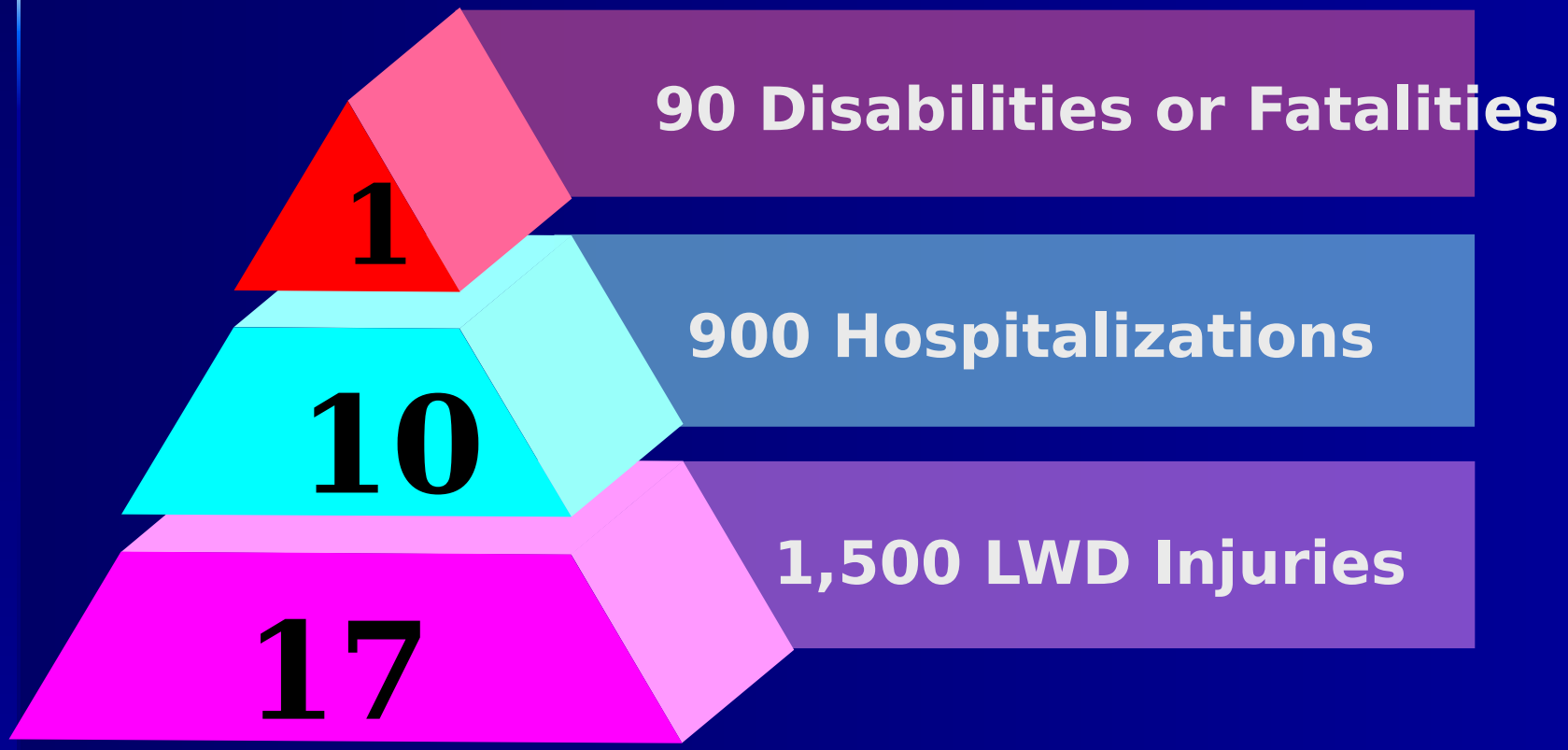
Mishap categories (severity level)

DoDI 6055.7

- Class A
  - Cost = $1M+
  - Fatal or totally disabling (perm)
  - Lost aircraft
- Class B
  - Cost: $200K - <$1M
  - Partially disabling (perm)
  - 3+ people hospitalized
- Class C
  - Cost: $20K - <$200K
  - **LWI 8+ hrs beyond current; occ illness (any lost time)**

USAF injury severity

Both reported and unreported
Annual averages and ratios



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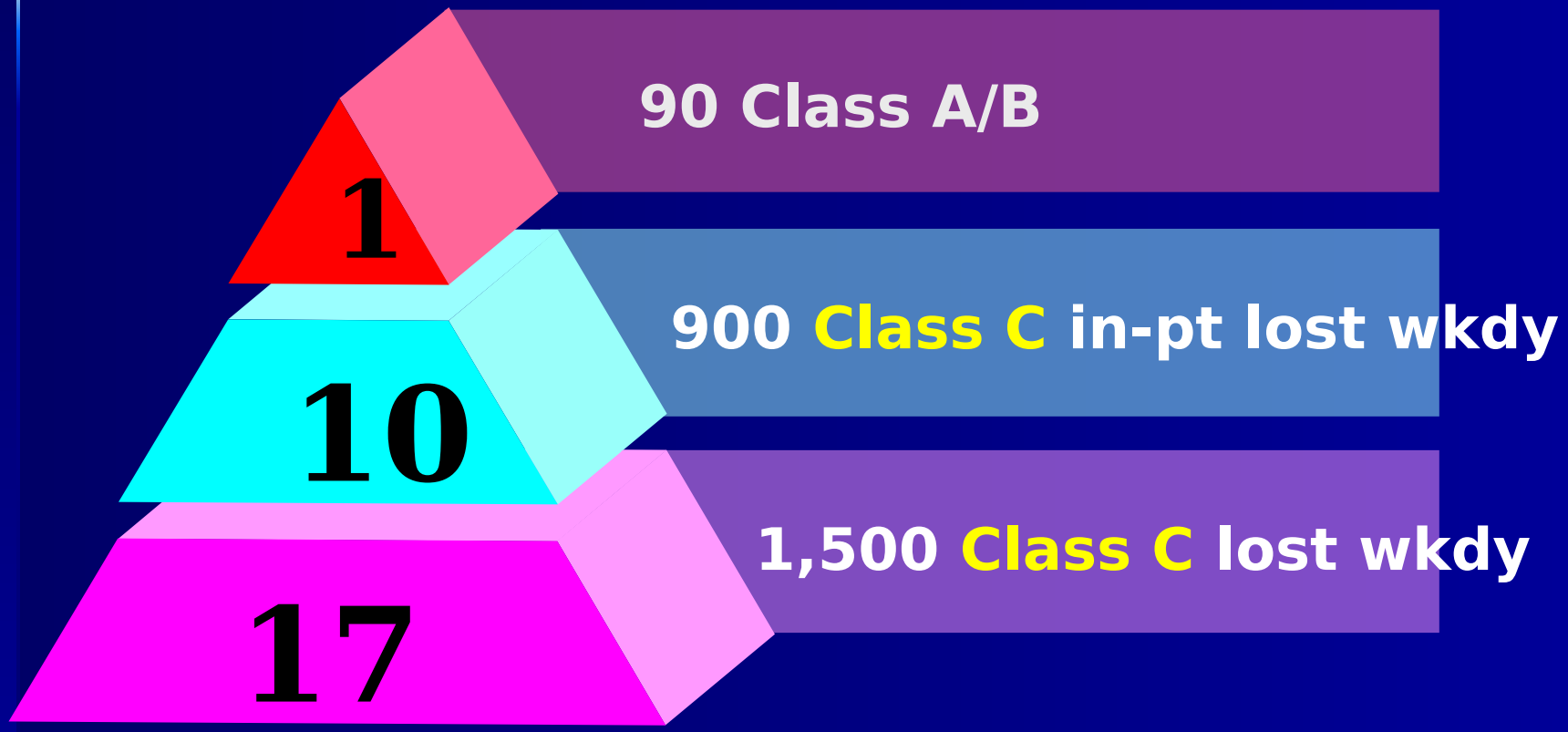


Conclusions on data

- For prevention focus, safety data best source
- Focus on Class C mishaps
  - Burden 27X Class A/B *
  - Unlike Class A/B, little is known
  - Greatest impact on LWD reduction in DoD
- Other services' safety ops: Class C reporting less emphasis → underreporting; info loss

* Includes the fraction of unreported Class C and non-report*able* "Class C-like" mishaps

Comparison of descriptive ability:

Domain	Data Type	Nature of injury (N)	External cause (E)
Medical (inpatient)	ICD codes (N) STANAG (E)	824.1 Fx of ankle-- Medial malleolus, open	239 Athletics/sports incl PT, other
Medical (outpatient)	ICD codes (N)	824.1 Fx of ankle-- Medial malleolus, open	Not available
Safety	Hierarchical taxonomy & narrative text	Inj Type = Fracture Body Part = Foot/ ankle	Subcat = Phys Cond Activity = Running Mechanism* = Pothole Time = 2200 hrs On_Base = YES Narrative: "Jogging on running trail, detoured onto Center St due to

* *Derived from narrative*

Comparison of descriptive ability:

Ex femur sliding into base during on base softball

Domain	Data Type	Nature of injury (N)	External cause (E)
Medical (inpatient)	ICD codes (N) STANAG (E)	820.03 Fracture, base of neck of femur	232 Softball and rounders
Medical (outpatient)	ICD codes (N)	820.03 Fracture, base of neck of femur	Not available
Safety	Hierarchical taxonomy & narrative text	Inj Type = Fracture Body Part = Leg	Subcat = S&R Activity = Softball Mechanism* = Sliding On_Base = YES Narr: “. . . sliding into 3rd base, non-breakaway type, on fielder’s choice.”

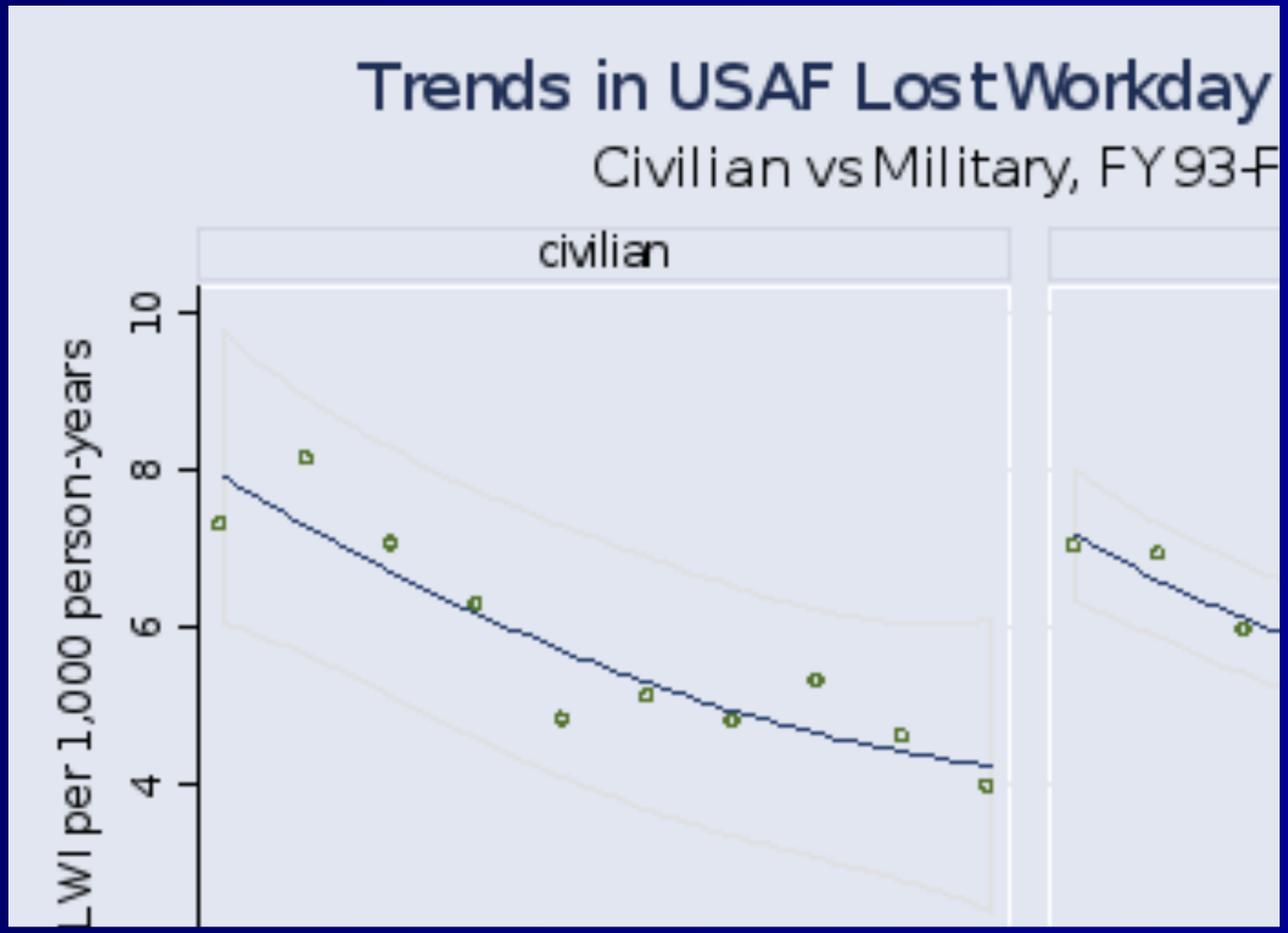
* *Derived from narrative*

Descriptive Analysis, Part I

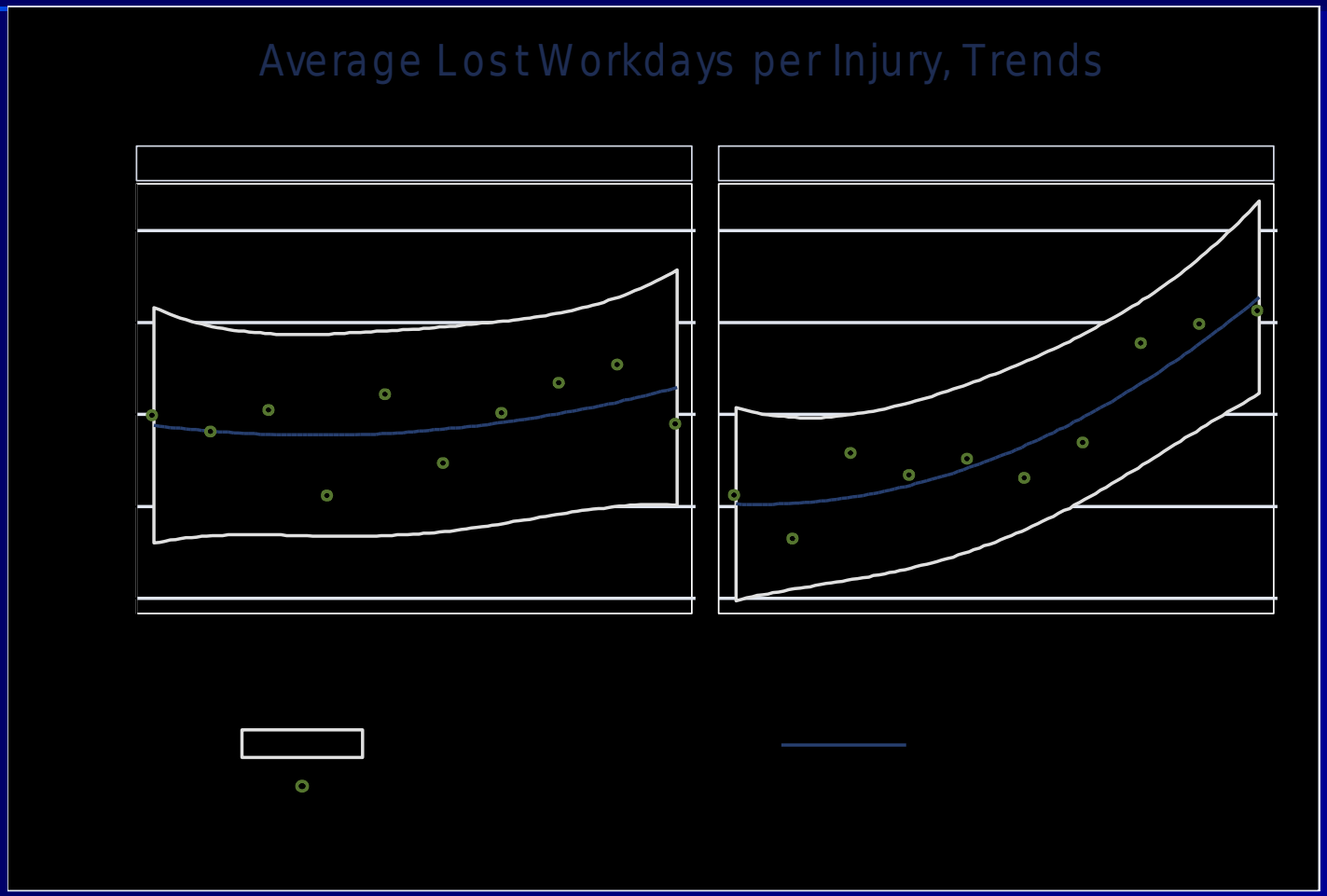
- Analyzed 34K reports; read narratives for additional info
- General trends and summary (PHM, Step #1)
  - Combined military & civilian rates/trends
  - LWI-producing activities & functional areas
  - Occupational injuries producing LWD

Total LWI burden, USAF

LWI Incidence Rates, USAF

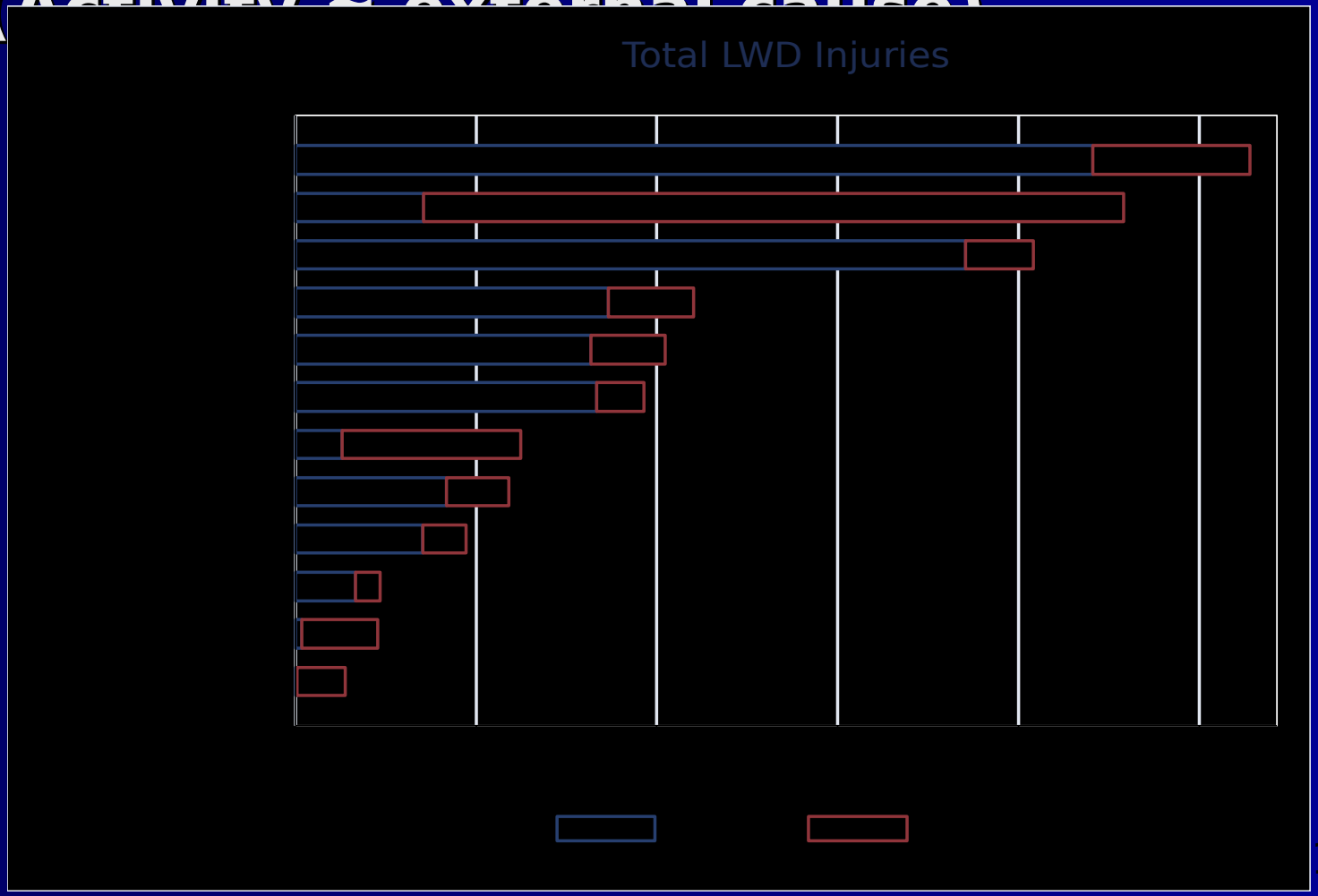


Trend in LWD per mishap increasing



LWI-producing activities

(Activity ≈ external cause)



Functional area loss leaders

In what area did injuries occur?

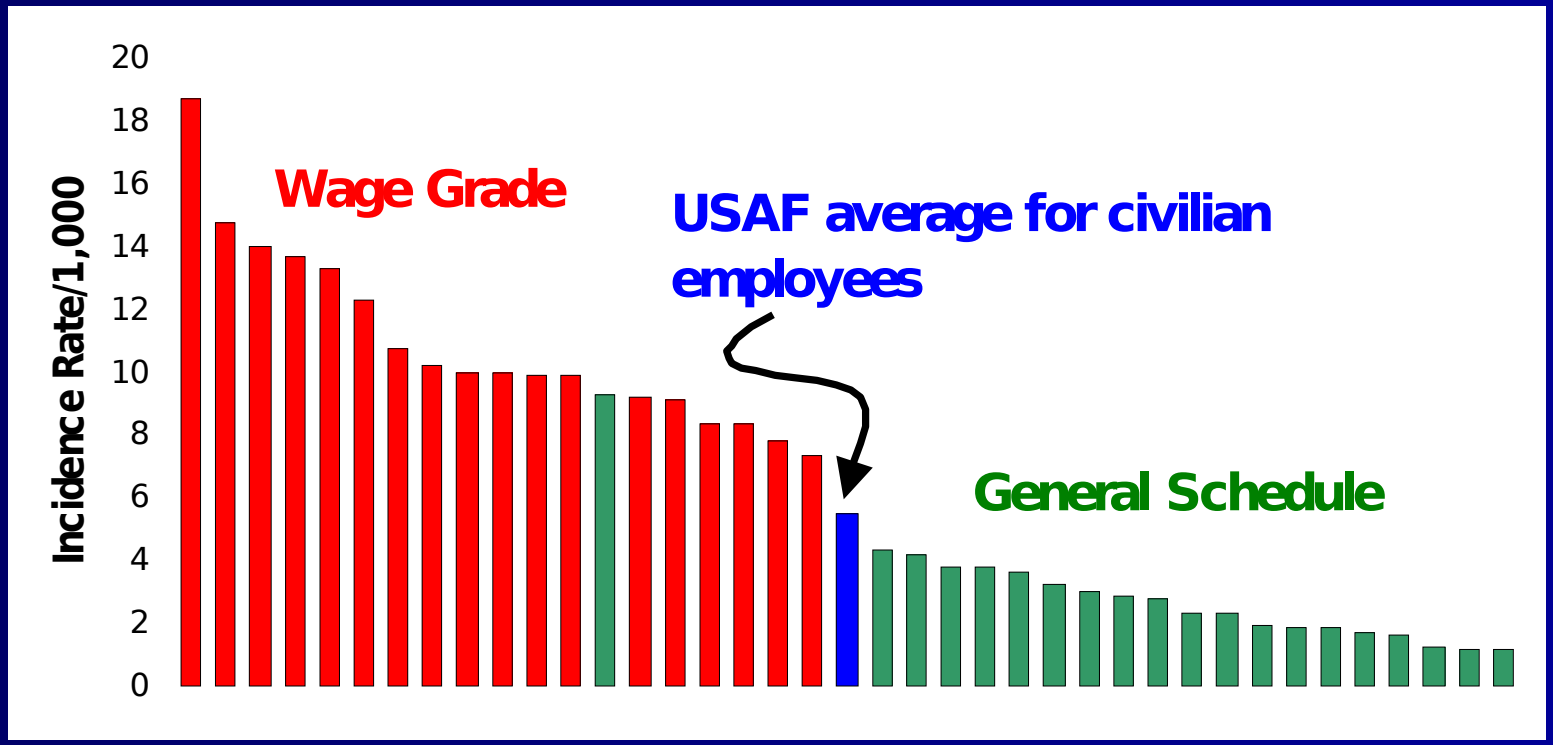
Lost workday inj rank	Functional Area	# Lost Workday Injuries	Lost workdays per injury (mean)	Percent Military
1	Military off-duty	18,250	8.0	100%
2	Aircraft maintenance	4,600	6.6	28%
3	Civil engineering	2,631	8.5	21%
4	Services/MWR	2,351	7.2	5%
5	Supply/Logistics	698	6.7	27%
6	Transportation	478	7.7	36%
7	Security	451	7.2	81%
8	Communications/Computer Ops	358	8.2	52%
9	Operations	328	8.0	63%
10	Medical/health services	321	7.6	43%

Note: 1,025 lost workday injuries were coded as "Other" in the database and are assumed to be "non-mainstream" functional areas

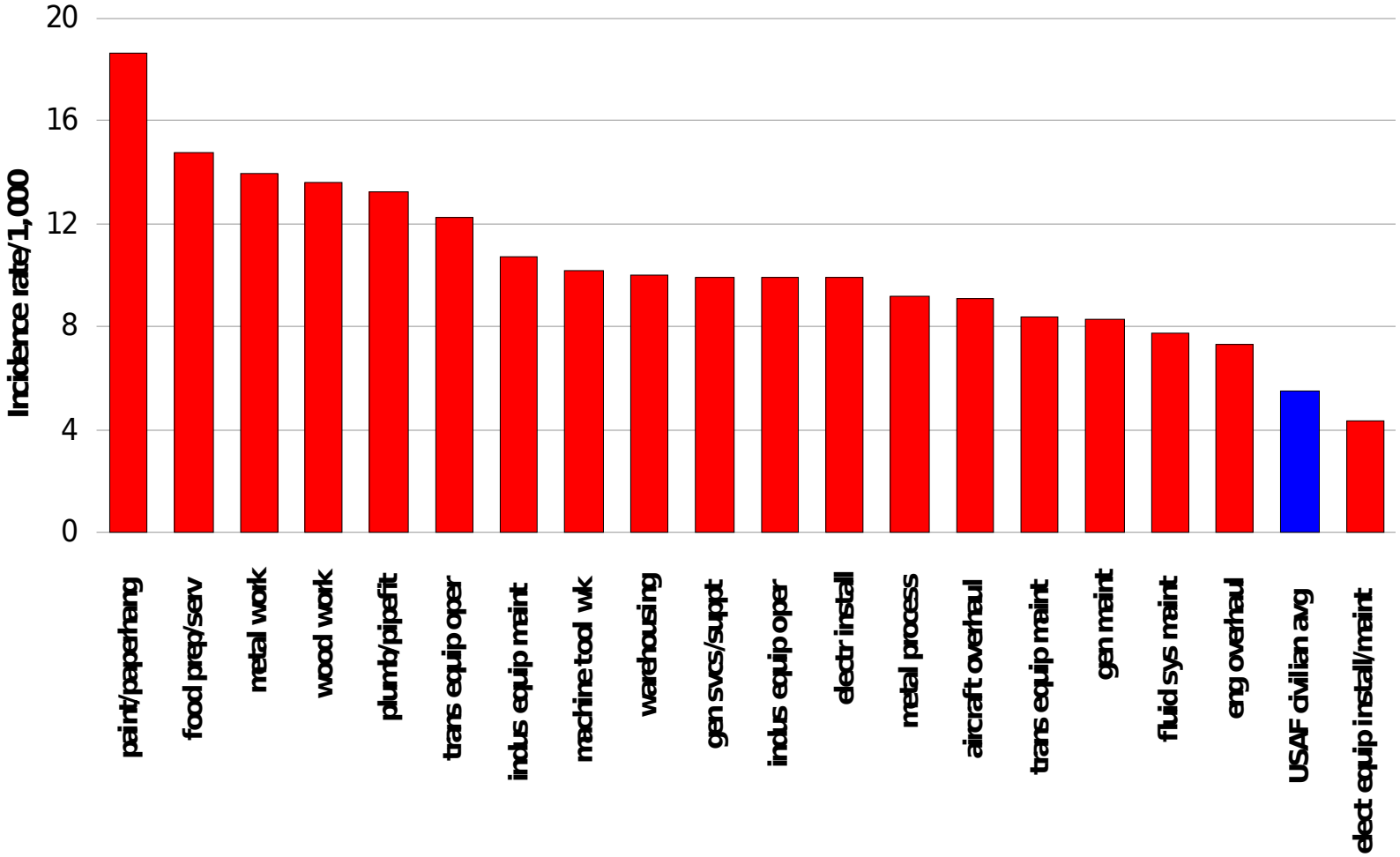
Predominant injury type by activity
Military only

Frequency Rank	Activity	Activities' nature of injury profile		
		Leading	Secondary	Tertiary
1	Operating vehicles or equipment	Fracture (31%)	Strain (29%)	Contusion (12%)
2	**Slips, trips, & falls**	**Fracture (42%)**	Strain (16%)	Sprain (13%)
3	Riding in/on vehicles or equip	Fracture (33%)	Strain (21%)	Contusion (14%)
4	Playing basketball	Sprain (37%)	Fracture (24%)	Strain (15%)
5	**Climb/descend stairs or ladder**	**Fracture (44%)**	Strain (16%)	Sprain (15%)
6	**Playing softball**	**Fracture (44%)**	Sprain (16%)	Strain (15%)
7	**Trail riding--dirt bike/ATV/Quad**	**Fracture (60%)**	Contusion (10%)	Strain (5%)
8	**Playing flag football**	**Fracture (36%)**	Sprain (19%)	Strain (15%)
9	Lift-carry-handle	Strain (87%)	Fracture (3%)	Sprain (2%)
10	**Snow skiing**	**Fracture (47%)**	Sprain (24%)	Strain (13%)

Occupational injuries
By occupational category



Occupational injuries
Wage grade categories



Part II – Detailed analysis for mishap prevention

- Developed taxonomy, combination of . . .
  - ICD-10 external cause codes
  - ICECI (Int'l Classification of External Causes of Injury)
  - STANAG cause codes
  - Epi perspective based on real-world data
  - Goal: Put into discrete hazard scenarios; optimal*:
    - No more than 6 scenarios needed to account for at least 90 percent of the events
    - Each scenario IDs at least 1 feasible & effective intervention strategy

*** Drury CG, Brill M. Human factors in consumer product accident investigation. *Hum Factors* 1983; 25(3):329-342.**

Slips, Trips, & Falls—ADAF On-Duty

716 lost workday injuries

Activity/ Factor	Example(s)	Injuries Reported (% of total)	Prevention
Snow/ice	- Slipped on ice in parking lot - Slipped on snow-covered walkway	**185 (26%)**	- Snow/ice removal - Correct footwear - Shuttle service
Liquids, beverages, wet surfaces	- Slipped on rain-slicked parking lot - Slipped on wet-mopped floor	**67 (9%)**	- Shop hygiene - Caution signs - Maintain plumbing - Non-skid surfaces
Carry or lift object; apply force	- Slipped while lifting patient - Slipped pushing refrigerator to wall	**55 (8%)**	- Shop hygiene - Non-skid surfaces - Closer supervision

<15% of STF injuries are associated with this causal factor

15% - 29% of STF injuries are associated with this causal factor

Slips, Trips, & Falls—Civilian Employees

3,250 lost workday injuries

Activity/ Factor	Example(s)	Injuries Reported (% of total)	Prevention
Snow/ice	- Slipped on ice in parking lot - Slipped on snow-covered walkway	**488 (15%)**	- Snow/ice removal - Correct footwear - Shuttle service
Liquids, beverages, wet surfaces	- Slipped on rain-slicked parking lot - Slipped on wet-mopped floor	**477 (15%)**	- Shop hygiene - Caution signs - Maintain plumbing - Non-skid surfaces
Oils, fuels, petro fluids, wax, food	- Slipped in hydraulic fluid puddle - Slipped on waxed floor	**212 (7%)**	- Shop hygiene - Non-skid surfaces - Closer supervision

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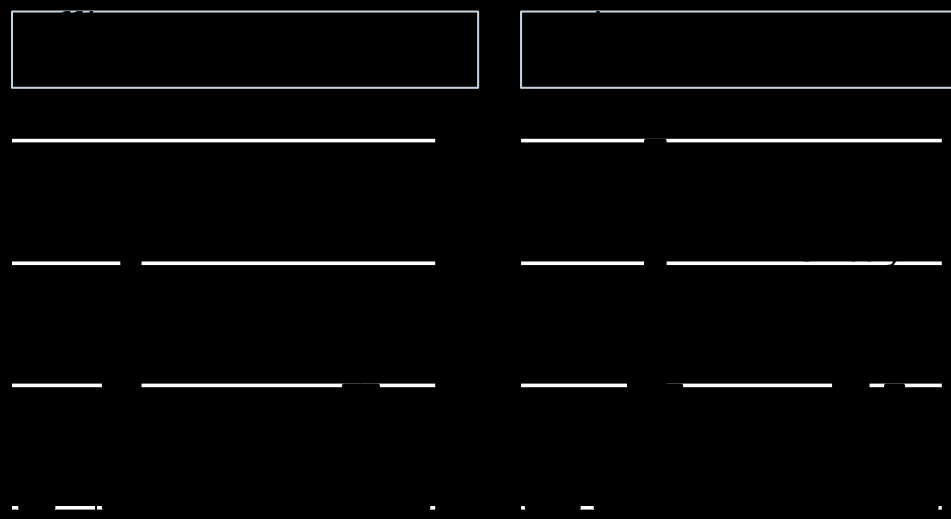
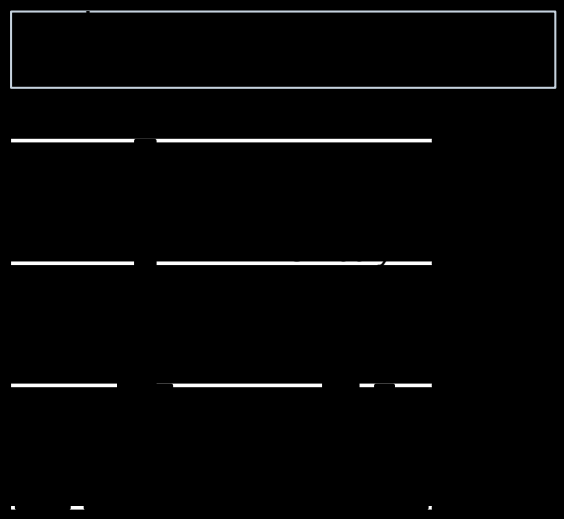
Oils, fuels, petro fluids, wax, food	212 (7%)	- Shop hygiene - Non-skid surfaces - Closer supervision - Clean-as-you-go
Sidewalks, curbs,	174 (5%)	- Lower curbs at crosswalks

Breakdown of 477 STFs due to surfaces that were wet or slick

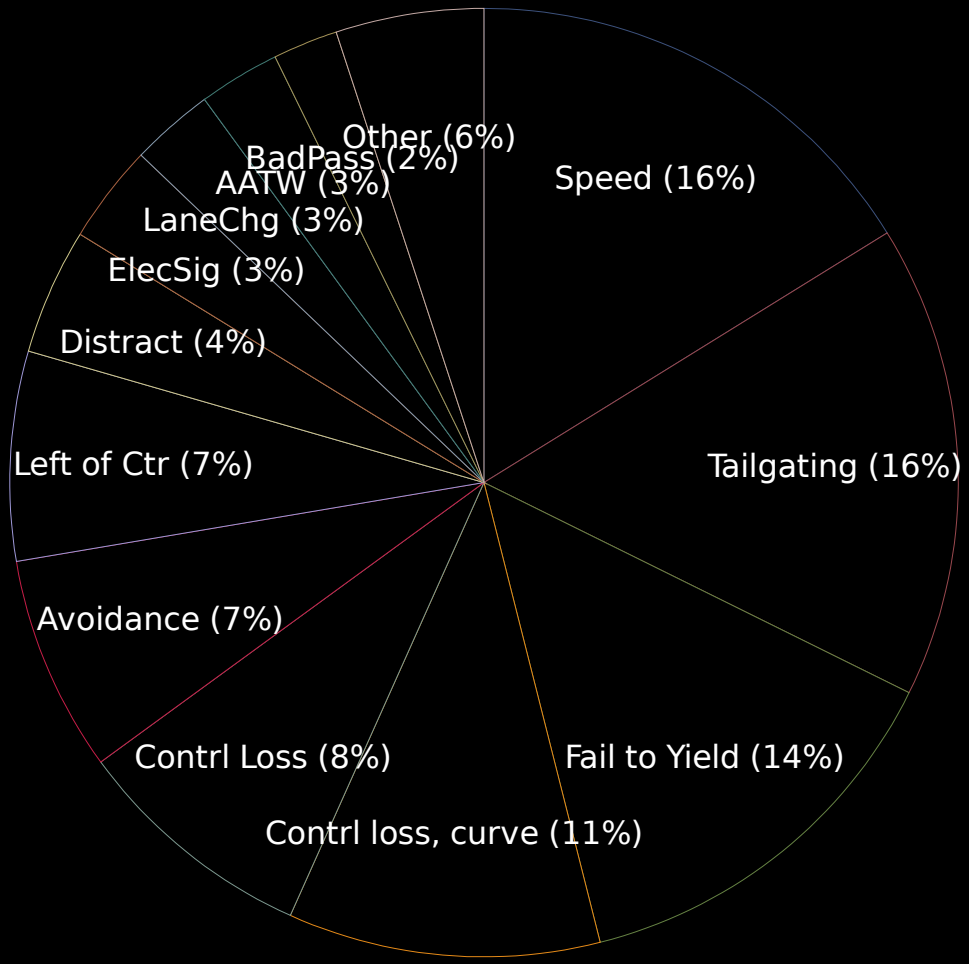
Surface/environment	Injuries Reported
Wet floor or surface, indoor	239
Wet floor or surface, specifically food prep or dining area	119
Wet surface, outdoors	54
Wet surface, child developmt ctr	39
Wet surface, misc	26

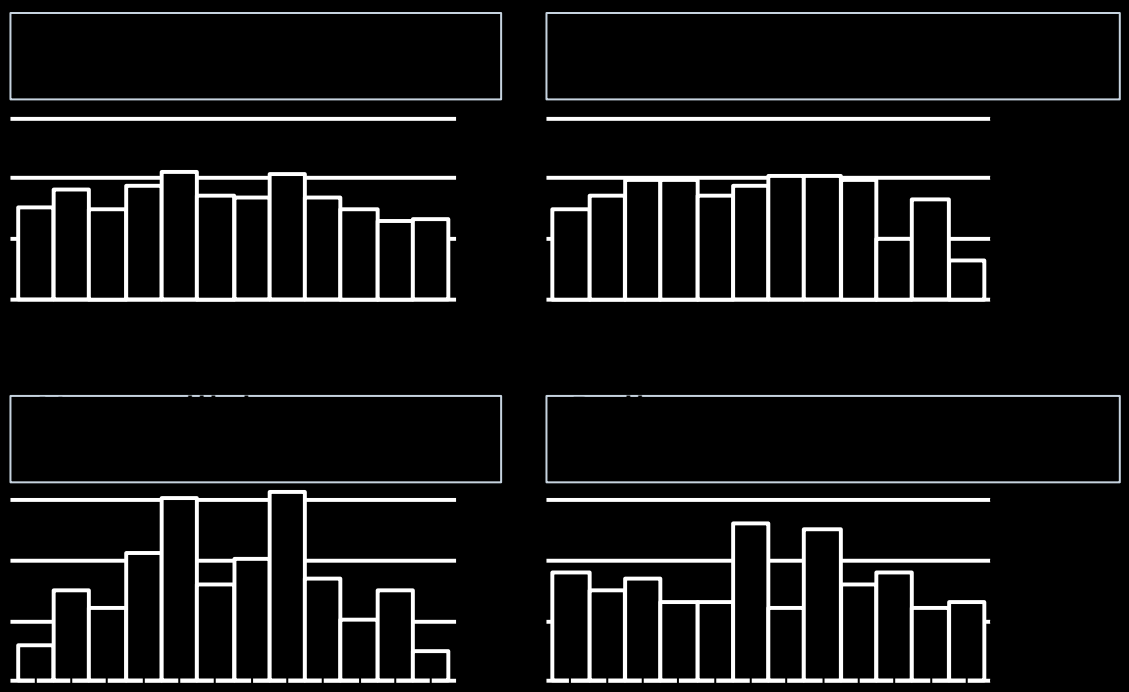
Graphs by location: on vs off base



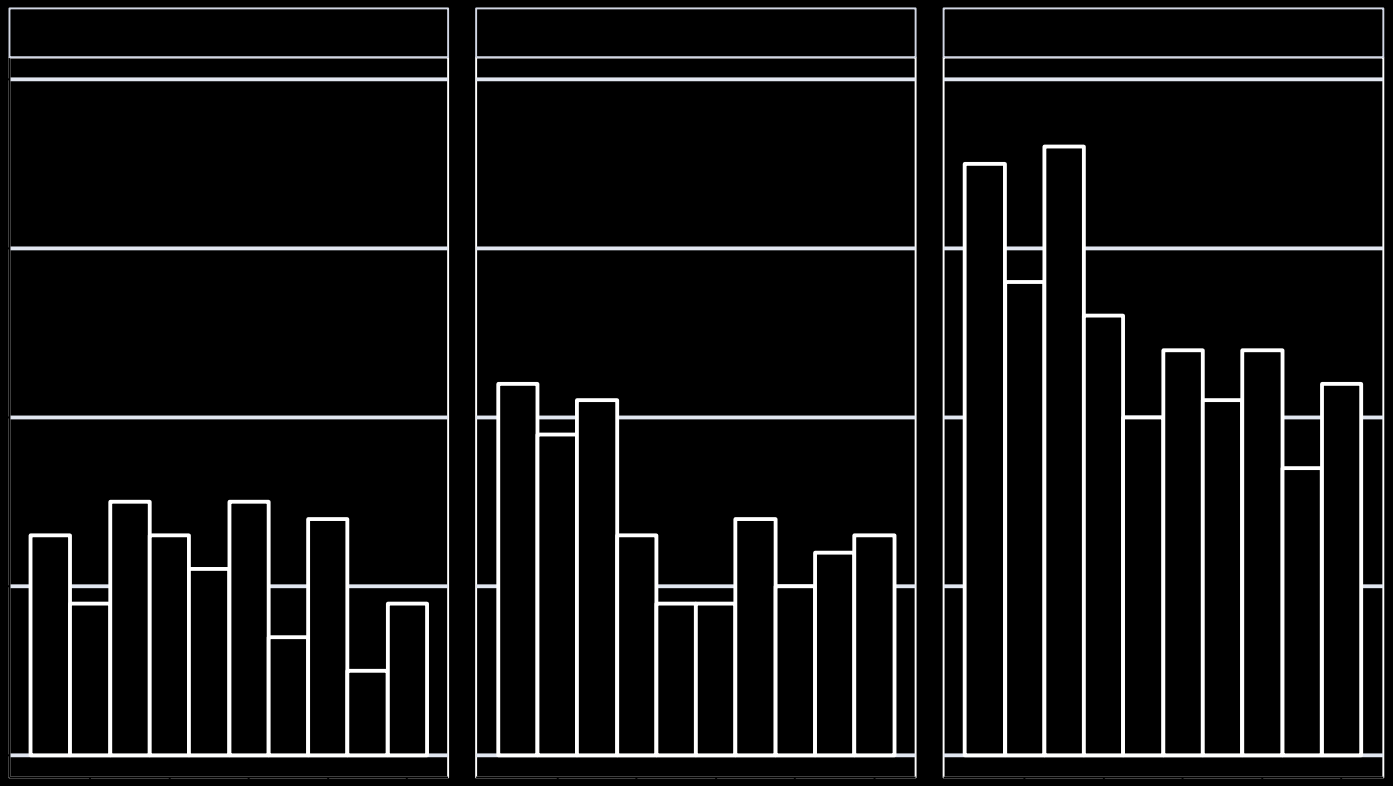


Class B & C PMV (2&4) & GOV Mishap Driving Behaviors

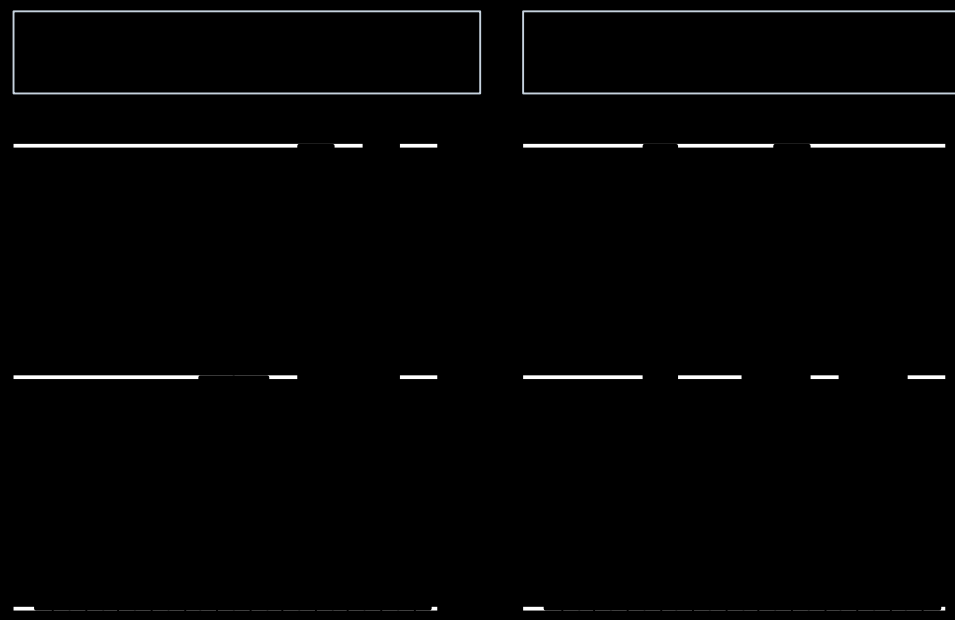




Injuries Caused by Operating Vehicles or Equipment



Graphs by on base vs off base



Graphs by Cause: visibility vs other

Graphs by spontaneous vs traumatic injury

Running injuries

Comparison of external causes of running injuries: Slips, trips, & falls (STF) vs non-STF

Slips/Trips/Fall Injuries (n = 84)			Non-STF Injuries (n = 87)		
Cause/Surface	**Injuries**	**%**	**Cause/Surface**	**Injuries**	**%**
Icy/wet surface	21	25%	Self-induced trauma†	31	36%
Unexplained *	20	24%	Curb/sidewalk	12	14%
Uneven surface/sand	11	13%	Uneven surface/animal hole	10	11%
Rocky/gravel surface	9	11%	Pothole	9	10%
Grass surface	8	10%	Struck object (e.g., log)	9	10%
Curb/sidewalk	5	6%	Rocky/gravel surface	7	8%
Animal interference	4	5%	Struck by vehicle	6	7%
Other identified causes	6	7%	Animal interference	3	3%

*** No apparent cause of traction/balance loss aside from the injured person, typically "stumbling"**

† For instance, muscle pulls apparently caused only by the action of running; includes 1 instance of hyponatremia, an electrolyte imbalance brought on by excessive water intake

Want more?

http://afsafety.af.mil

New! Descriptive Epidemiology of USAF Lost Workday Injuries, FY93-FY02

- **Policy, Plans & Technology**
  Senior Safety Advisory Council (SSAC) Minutes
  - Action Items
  System Safety Group Schedule as of 2 Mar 04

Descriptive Epidemiology of USAF Lost Workday Injuries, FY93-FY02 - Part I (May 2003)

Summary

- Need to move closer to causal information to achieve 50% reduction
- Class C (lost workday) data hold the most information and are the crux of the problem from a metrics standpoint
- Safety data are the only data source that gives sufficient information on causes & mechanisms
- Must be used by commanders to be of value

Questions?

Supplemental slides on data sources

Potential data sources: Medical

- ICD-9 coding for nature of injury and STANAG for external cause (inpatient only)
  - Good info for nature of injury(ies)
  - STANAG not detailed enough in some areas such as sports/recreation injuries
  - ICD E coding not yet available for outpatient visits . . . same limitations as STANAG
- Conclusion: “Wide but shallow”
  - Best for PH surveillance (Step #1 in PH model)
  - Limited use in prevention

Potential data sources: Safety

- Non-medical taxonomy
  - Loss of precision for nature of injury
  - Includes mishap narrative →cause & circumstances of injury
    - Coded data alone insufficient for prev info
    - Best: coded + keyword searches in narrative → ad hoc taxonomy similar to Lincoln, et al (*Injury Prevention*)
- Reporting threshold; mode = passive
- Conclusion: "Deep but narrow"
  - Best for prevention information/research
  - Systematic underreporting limits use in surveillance